2009 REVIEW OF THE DEEP PANUKE ENVIRONMENTAL EFFECTS MONITORING PLAN

Context

In 1996, DFO Maritimes Science provided expert advice to the Canada-Nova Scotia Offshore Petroleum Board regarding the assessment of the 2006 Deep Panuke Comprehensive Study Report, and the proposed Environmental Management Plan (EMP) associated with construction of Deep Panuke project (DFO 2006).

DFO Maritimes Science has subsequently been requested by the Oceans, Habitat and Species at Risk Branch to provide expert advice on an update to the EMP, specifically on the document entitled "2009-2010 Drilling Environmental Protection Plan/Environmental Effects Monitoring Plan (EPP/EEMP)" which outlines measures EnCana proposes to take to avoid/minimize potential effects on the marine environment by drilling activities associated with Deep Panuke Project construction. In particular, DFO Science was requested to address the following questions:

1. Are the mitigation measures outlined in Sections 5.1 and 5.2 (p.12-13) of the EPP/EEMP sufficient to avoid/minimize potential effects on the marine environment and, if not, what other measures could be undertaken?

2. The EPP/EEMP does not address the potential effects of noise on marine species. Is drilling noise likely to be loud enough to warrant some form of shutdown procedure or other mitigation?

3. The EPP/EEMP does not address the potential for a blowout or well collapse. What is the likelihood that these events would occur, and what measures could be taken to avoid/minimize their occurrence? If they do occur, what would be the potential severity of the impact on the marine environment?

4. Are there any species at risk in the area that the proponent should consider in its EPP/EEMP? If so, are there any procedures to avoid/minimize the effects of drilling activities on these species?

Given the short timeframe for review, the Science Special Response process was used to produce this Science Response.

Response

Response to Question 1

Q1. Are the mitigation measures outlined in Sections 5.1 and 5.2 (p.12-13) of the EPP/EEMP sufficient to avoid/minimize potential effects on the marine environment and, if not, what other measures could be undertaken?

The approach proposed should be sufficient to avoid or minimize effects on the environment. The use of water-based mud (WBM) for drilling is appropriate, as is the plan to restrict the use of barite in the drilling fluid to specific situations. However, the EPP/EEMP does not include a field monitoring program to verify the concentration and dispersion of barite and other metals of concern (e.g., mercury) following release. Such a monitoring plan may provide confirmation of the predicted minimal impact levels.

Impact of flaring should be minimal as the burner efficiency is very high, and any fallout from flaring should not have a significant impact on marine biota, as the system can be shut down relatively quickly in the event of operational failure that results in reduced efficacy of the flare burner unit. Environment Canada has the regulatory mandate to address issues related to air quality and birds.

Response to Question 2

Q2. The EPP/EEMP does not address the potential effects of noise on marine species. Is drilling noise likely to be loud enough to warrant some form of shutdown procedure or other mitigation?

While the EPP/EEMP makes no direct reference to marine acoustic noise and its potential effects, it does reference the 2006 Deep Panuke Environmental Assessment Report. In several places, the EPP/EEMP makes passing reference to potential acoustic effects and, in turn, references the October 2002 Deep Panuke Comprehensive Study Report (CSR), which does quote a few representative noise levels from the literature.

The proposed well drilling and well re-entries will be conducted by a mobile offshore production unit 'jack-up' rig (Rowan Gorilla III). While no radiated noise measurements specific to this rig are available, the commonly quoted and prevailing wisdom is that expressed by Richardson et al. (1995): Drillships generally radiate the highest levels of noise, semi submersibles less, and bottom-founded platforms (including jack-ups) probably the least. The lower noise levels associated with jack-up rigs appear to be due to the fact that vibrating machinery is mounted on a deck or hull not in direct contact with the water, the support columns contacting the water are not especially efficient acoustic radiators, and also jack-up rigs do not have cavitating propellers in nearly constant use for dynamic positioning. The jack-up noise levels quoted in nearly every drilling EA are those from Gales (1982) (also quoted in Richardson 1995) of 119 - 127 dB relative to 1 µPa in the near-field of the platform, peaking at about 5 Hz. These numbers are also quoted in the 2002 Deep Panuke CSR.

Figure 6.18 from Richardson (1995) may be useful for placing upper bounds on longer range noise influences. In this Figure, it is demonstrated that noise radiated from (presumably) noisier semi submersible and drillships falls to about ambient background within several kilometers to several 10s of kilometers from operating centres. A jack-up rig is likely to be no noisier than a semi submersible suggesting than the range for elevated noise levels is very likely less than 10 km (this does depend on water depth and other factors).

Emission of significant infrasonic line spectral energy (say under 10 Hz) has been noted for operating drill rigs. However, because of the 40 m water depth around the Deep Panuke site, acoustic energy in this infrasonic spectral range will not propagate efficiently away from the site especially in the direction of the shallows around Sable Island.

Based on information provided in Section 7.2 of the EPP/EEMP, it appears there will be several vessels involved in the activity. One assumes that the two standby vessels will be on site and probably holding station or cruising in a tight pattern for immediate response. Vessels are strong acoustic noise sources and, at speed, tend to radiate at levels comparable to drillships (Compare Figs. 6.9 and 6.18 in Richardson 1995). Therefore, it's not unreasonable that the standby (and supply) vessels associated with Deep Panuke will radiate at least comparable and possibly even more noise (depending on their activity) than the jack-up rig.

Potential environmental impacts of the drilling activity might be expected for baleen whales that have very sensitive hearing below 1 kHz. Since shallow water surrounds the Deep Panuke site for well over a 10 km range, since shallow water would appear not to be a preferred habitat for baleen whales or their prey, and also considering noise exposure levels probably do not exceed those arising from common ship traffic on the Scotian Shelf, one might assume that jack-up drilling at Deep Panuke would not require any special mitigation.

More extensive measurement and documentation of acoustic noise levels around active drilling rigs is recommended. If such measurements were readily available, conclusions on the proposed EPP/EEMP could be placed on a much firmer basis.

Response to Question 3

Q3. The EPP/EEMP does not address the potential for a blowout or well collapse. What is the likelihood that these events would occur, and what measures could be taken to avoid/minimize their occurrence? If they do occur, what would be the potential severity of the impact on the marine environment?

Considering recent advances in blow-out prevention systems, the probability of a blow-out is low. However, the EPP/EEMP may outline mitigation measures to handle such an emergency situation, were it to occur.

In the event of a blowout, the hydrocarbons released would be in the form of condensate. Impacts would depend on the rate and duration of the release. A concern is the possibility of condensate coming to shore on nearby Sable Island, which could then become entrained in sediment. The models used by the proponent predict that a blowout discharge would drift away from Sable Island. The proponent's modeling results seem reasonable under typical conditions, such as small spill volumes and strong winds that increase drift speed but also increase evaporation and vertical mixing, resulting in relatively fast dissipation of the slick. However, there may be certain conditions, specifically modest winds in one direction for several days, under which evaporation may be reduced and drift distance may be increased such that there could be an increased, though still very low, risk of an oil spill reaching Sable Island.

Response to Question 4

Q4. Are there any species at risk in the area that the proponent should consider in its EPP/EEMP? If so, are there any procedures to avoid/minimize the effects of drilling activities on these species?

The proposed EPP/EEMP does not address species at risk issues in any way, although species at risk were addressed in the 2006 Comprehensive Study Report. A number of sensitive species are known to be resident in the study area. These include:

North Atlantic right whale (endangered)
Leatherback turtle (endangered)
Northern bottlenose whale (endangered)
Blue whale (endangered)
Harbour porpoise (threatened)
Atlantic wolfish (special concern)
Loggerhead turtle (COSEWIC)

While these species are sighted only relatively rarely in the area, and the area in question does not constitute primary habitat for any of the species listed above, mitigation measures should still be considered. These may include trained marine mammal observers present on the drilling platform during operations, a strategy to ramp up drilling activity slowly to prevent sudden introduction of loud noise into the water column, and plans to modify activities if sensitive species are known to be in the area. Mitigation methods similar to these are required for this project, and should be detailed in the monitoring plan.

Conclusions

In many areas the proposed EPP/EEMP addresses key areas in sufficient detail, using practices and methodology available from established literature. However, most of the mitigation measures proposed are based on theoretical consideration alone, and they do not include a plan for field monitoring at the drilling site. In particular, a program to measure barite and heavy metals potentially produced by the drilling operations may provide confirmation of the minimal impact predicted in the 2006 Comprehensive Study Report.

Potential effects of noise on marine species is not addressed in the plan. Review of existing literature would indicate that potential noise effects from the drilling rig are likely to be limited; however, noise from support vessels may warrant some consideration. Actual measurements and documentation of the noise levels around the drilling site would allow firmer conclusions on the monitoring plan.

The EPP/EEMP does not address species at risk issues in any way, although species at risk were addressed in the 2006 Comprehensive Study Report. A number of sensitive species are known to reside in the study area. A program to monitor these species, using standard, accepted practices, is recommended.

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Sources of Information

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